GOES-R Operations Summary

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November 18, 2003

Operations Activities Based on GOES-N Plans

- Schedule Generation
- Daily Schedule Uploads, Operations
- Periodic Activities, Special Procedures
- Spacecraft Monitoring
- Other Ground System Elements
- Contingencies
- Distributed Architecture

Schedule Generation

- Daily schedules generated 2-4 weeks in advance, contain
  - Frame schedule
  - Star observation information
  - Housekeeping commands
  - Weekly calibrations
  - Special activities (maneuvers, thruster flush, etc)
  - Ground Commands for uploads of next day's schedule
- Stored command uploads, plus ground schedules
- May require 2 or 3 stored schedules per day, choose in real time
- Typically 2 housekeeping periods (10 minutes) per day
  - Momentum management, EW orbit adjustment, clock adjust
- Automated schedule generation, many days at a time

Schedule Generation – IMC Sets

- Image Navigation and Registration (INR)
  - Mostly computed in realtime on the ground
  - IMC for mirror motion adjustment to maintain INR within range of ground resampling algorithm
  - IMC data computed a end of each day for next day
  - IMC data to be uploaded at time of schedule uploads
  - Possible IMC updates during day
- INR calculations to include Dynamic Motion sensing, geometric correction for large sensor array

Daily Schedule Uploads, Operations

- Daily schedules to be uploaded at least 2 hours prior to use
  - 2–3 schedules per day
  - Frame tables may be adjusted
  - Star tables may be adjusted
- Table uploads to be automatic, via ground schedules
  - Uploads
  - Special activities (maneuvers, thruster flush, etc)
- Stored command execution to continue without commanding
  - May wish to switch to a different schedule in real time

Periodic Activities

- Typical daily schedules are identical from day to day, except:
  - Star observations will change
  - Housekeeping EW unloads may change
  - Weekly SEM/SXI calibrations will be included
  - Eclipse/KOZ may require frame adjustments
- Maneuvers will be done by uploaded schedules
  - North-South maneuvers (1 per year)
  - Yaw Flip maneuvers (2 per year)
  - Some maneuvers may be done manually (RT CPs)
- Special procedures will occur

Special Procedures

- Irregular or unpredictable command activities
  - Attitude System microprocessor uploads
    - Optimized parameters
    - Fixes to problems
  - Battery charge management
  - Comm system management
  - Special TM modes (dwell)
  - Heater management
- Contingency responses

Spacecraft Monitoring

- Full-time monitoring of all spacecraft
  - Limit monitoring in ground system
  - Safety monitors (alarms) cannot be disabled
  - Automatic Fault Protection in some cases
  - On-Line contingency recognition, response assistance
- Contingency Procedures to be developed
- Data trending reviewed by Engineers
- Redundant Ground System hardware always available
  - Need automatic ground system failover in most cases
  - Need ground system config visibility at ops station

Other Ground System Elements

- Operations monitors, operates, performs failovers
- Sensor Processing System (SPS)
  - Image Calibration, Formatting, Resampling
  - High Data Rates for ABI, HES
- Product Monitor
  - ABI, HES Landmarking, product visibility at SOCC
- Orbit and Attitude Planning System
  - Daily maintenance of orbital position, momentum
- Instrument Data Display Systems
  - SIS (SXI), etc
- Ground Station Systems

Contingency Operations

- Automated Fault Protection, with Manual Responses
  - Automated Fault Protection
    - Clearly defined faults
    - Response well understood
    - Operators to be notified
    - Usually require operator follow-up
  - Manual Responses
    - Experience shows that about half of anomalies are not those we prepared for
    - For anomalies not handled by Fault Protection
    - After FP response, may require operator cmds
    - On-line help for manual responses to be provided
- Major anomalies will require Anomaly Review Board to determine way to proceed

GOES-R Distributed Architecture

- Operations with 2 Spacecraft as GOES-EASTA, GOES-EASTB, etc
  - Address impact to ground ops work
    - Double antennas?
    - Data streams?
    - Double monitors?
  - Schedules equally complex for 1 or 2 instruments
  - Maneuvers for each spacecraft
    - Same engineering team for all maneuvers
- Co-located spacecraft require separate telemetry services
  - May require accurate orbital maneuvers for co-located orbits